

REMARKS

Claims 25-67 are now presented for examination. Claims 25-35, 42, 43, 47-56, 63 and 64 have been cancelled without prejudice or disclaimer of subject matter. Claims 40, 59 and 61 have been amended to define still more clearly what Applicant regards as his invention, in terms which distinguish over the art of record. Claims 36, 38, 40, 57, 59 and 61 are the only independent claims.

Claims 40 and 61 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. These claims have been objected to in that the phrase "a straight line connecting apertures of the adjacent two separating portions is not contained in any of planes including optical axes of the optical elements of the adjacent two separating portions" is not understood. As currently amended, Claim 40 more clearly recites "wherein a straight line connecting apertures of the adjacent two separating portions is not in any plane that contains an optical axis of the optical elements of the adjacent two separating portions". Claim 61 has been similarly amended. In view of these amendments, it is believed that Claims 40 and 61 as currently amended fully meet the requirements of 35 U.S.C. § 112, second paragraph.

Claims 36-41, 44-46, 57-62 and 65-67 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,690,528 to Tanimoto et al.

Previously added independent Claim 36 is directed to exposure apparatus in which an optical system has plural spaces separated by plural separating portions. Each separating portion includes an optical element and a supporting portion that supporting the optical element. Each of two adjacent separating portions of the plural separating portions

has an aperture through which a gas can be transmitted. Apertures of the adjacent two separating portions are disposed at rotational positions about the optical axis of the optical system with angles other than zero and 180 degrees.

Previously added independent Claim 57 is directed to exposure apparatus in which a first separating portion separates a first space and a second space from each other. The first separating portion has a first aperture. A second separating portion separates the second space and a third space from each other. The second separating portion has a second aperture. A supply unit supplies a gas to one of the first and third spaces. The relative rotational position of the first and second apertures about the optical axis of the exposure apparatus defines an angle other than zero and 180 degrees.

In Applicant's opinion, Tanimoto et al. discloses a projection exposure apparatus used to project a minute pattern formed on a photomask or reticle onto a semiconductive wafer that has a stabilized image-forming performance. In the apparatus, a projection lens system includes a plurality number of lens elements spaced apart from each other. A supply unit supplies a gas flow to at least one of spaces through which the gas passes and an isolating unit isolates the space(s) supplied with gas from atmosphere. A changing unit changes the refractive index of the isolated space(s).

According to the invention defined in Claims 36 and 57, the apertures of adjacent two separating portions are disposed at rotational positions about the optical axis of an optical system with angles other than zero and 180 degrees. Advantageously, the gas flow through the optical system does not extend along a straight line.

Tanimoto et al. may teach an air holes located at lens separating portions of an optical system. As clearly shown in the cross-sectional diagram of Fig. 7 of Tanimoto et al., the air hole 212 for the lens L3 is positioned 180 degrees from the air hole 211 for the lens L2 and the air hole 213 for the lens L4 is positioned 180 degrees from the air hole 212 in a plane of the optical axis of the lenses. Further, Tanimoto et al. fails in any manner to suggest other than a positional relationship of 180 degrees between the air holes. In contrast to the 180 degree differences in the positions of adjacent lens air holes of Tanimoto et al., it is a feature of Claims 36 and 57 that the apertures for adjacent lens positions are disposed at rotational positions other than zero and 180 degrees. As a result, it is not seen that Tanimoto et al. in any manner teaches or suggests the feature of Claims 36 and 57 of apertures of adjacent separating portions being rotated from one another at other than zero or 180 degrees. It is therefore believed that previously added Claims 36 and 57 are completely distinguished from Tanimoto et al. and are allowable.

Previously added independent Claim 38 is directed to exposure apparatus in which an optical system has plural spaces separated by plural separating portions. Each separating portion has an optical element and a supporting portion that supports the optical element. Each of two adjacent separating portions of the plural separating portions has an aperture through which a gas can be transmitted. A straight line connecting apertures of the adjacent two separating portions is not parallel to any of the optical axes of optical elements of the adjacent two separating portions and the straight line does not intersect any of the optical axes of the optical elements of the adjacent two separating portions.

Currently amended independent Claim 59 is directed to exposure apparatus in which an optical system directs light to an object to be exposed. A supply unit supplies a gas to one of first and third spaces. The optical system includes a first separating portion that separates the first space and a second space from each other and a second separating portion that separates the second space and the third space from each other. The second separating portion has a second aperture. A straight line connecting the first aperture and the second aperture is not parallel to an optical axis of the optical system and also does not intersect the optical axis.

In accordance with the invention of Claims 38 and 59, a straight line connecting apertures of the adjacent two separating portions is not parallel to and does not intersect the optical axes of the optical elements of the adjacent two separating portions. Accordingly, the apertures are not aligned along a straight line and flow of gas through the optical element in a straight line is avoided.

As discussed with respect to Claims 36 and 57, Fig. 7 of Tanimoto et al. clearly shows the air holes 211, 212 and 213 in the same plane as that of the optical axes of the optical elements L2, L3 and L4. Since a straight line between air holes 211 and 212 and a straight line between air holes 212 and 213 are not parallel to the optical axis of the optical system, the straight line between air holes 211 and 212 and the straight line between air holes 212 and 213 intersect the optical axis of lens L2. As a result, it is not seen that Tanimoto et al. in any manner could teach or suggest the feature of Claims 38 and 59 of the straight line connecting apertures of adjacent two separating portions not intersecting any optical axis of the optical elements of the adjacent two separating portions. It is therefore

believed that Claims 38 and 59 are completely distinguished from Tanimoto et al. and are allowable.

Currently amended independent Claim 40 is directed to exposure apparatus in which an optical system has plural spaces separated by plural separating portions. Each separating portion includes an optical element and a supporting portion that supports the optical element. Each of two adjacent separating portions of the plural separating portions has an aperture through which a gas can be transmitted. A straight line connecting apertures of the adjacent two separating portions is not in any plane that contains an optical axis of the optical elements of the adjacent two separating portions.

Currently amended independent Claim 61 is directed to exposure apparatus in which an optical system directs light to an object to be exposed and a supply unit supplies a gas to one of first and third spaces. The optical system has a first separating portion that separates the first space and a second space from each other. The first separating portion has a first aperture and a second separating portion separating the second space and the third space from each other has a second aperture. A straight line connecting the first aperture and the second aperture is not in any plane that contains an optical axis of the optical system.

It is a feature of Claims 40 and 61 that the straight line connecting apertures of adjacent two separating portions is not in any plane that contains an optical axis of the optical elements of the adjacent two separating portions. As discussed with respect to Claims 36 and 57, Tanimoto et al. is restricted in Fig. 7 to teaching that air holes between adjacent optical element spaces are located 180 degrees apart in a plane of optical axes of

the optical elements and fails to suggest in any manner that the air holes 211, 212 and 213 in the lens support frame between adjacent optical element spaces could be located at other than 180 degrees apart. Accordingly, it is not seen that Tanimoto et al. in any way suggests the feature of Claims 40 and 61 of a straight line connecting apertures of adjacent two separating portions not being in any plane that contains an optical axis of the optical elements of the adjacent two separating portions.. It is therefore believed that Claims 40 and 61 as currently amended are completely distinguished from Tanimoto et al. and are allowable.


A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record. Applicant submits that the amendments to independent Claims 40 and 61 clarify Applicant's invention and serve to reduce any issues for appeal.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application. The Examiner is respectfully requested to enter this Amendment After Final Action under 37 C.F.R. § 1.116.

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Respectfully submitted,


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